

WebQuest: When Atoms Bond

You will use 2 video segments and 3 websites to learn more about why and how atoms form bonds. Pay close attention to **bold** terms and always use complete sentences.

Before you begin, consider what you already know:

1. Fill in the chart below with some of what you already know about **substances** and **particles**:

Some important terms you'll need:	In your own words, define each term.	Draw an image that shows your definition visually.	Give several examples for each term.
Element			
Compound			
Mixture			
Ion			

2. In your own words, define what a **chemical bond** is.

Watch the first video segment, “Introduction to Chemical Bonding.” Answer these questions about the big ideas of bonding:

3. Near the beginning of the video, you hear that “Everything in the world comes from less than 100 simple substances that have been around since the beginning of time.” What are the substances the video is talking about? Exactly how many of these “simple substances” are naturally found on earth?
4. Many people have tried to determine the number of chemical substances in our world. Different sources claim that there could be anywhere from 7 million all the way up to 50 million unique substances. How many unique substances does the video claim Chemists have found on earth?
5. Circle the words below that are mentioned in the video. Then, write one statement that explains the connection between all of these terms and the idea of **chemical bonding**.

Octet	Chemical reaction
Valence electrons	Stable
Noble gases	Compounds

6. Why **don't** elements in **column 18 (8A)** of the Periodic Table easily form bonds?
7. What happens to the **energy** and **stability** of an atom when it forms a chemical bond?
8. Use the terms from question 5 to answer (and explain) the following very important question:
Why do atoms form bonds?

There are 3 main types of chemical bonding that we will focus on:
ionic bonding, **covalent** bonding, and **metallic** bonding.

Go to the [first weblink](#) and follow the interactive explanations and directions. As you go through the online activity, answer these questions about ionic bonding.

http://www.teachersdomain.org/asset/lsp07_int_ionicbonding/

9. Slide 1 gives an over-simplified explanation of ionic bonding. Complete the following sentences:

Ionic bonds are formed between _____.
Ionic bonding involves the _____ of _____.

10. Slides 2 – 4 show you how the charges of ions interact with each other. Use phrases or diagrams to show how ions interact with one another in the following chart:

2 ions with...	Like charges	Opposite charges
At large distances from one another		
At medium distances from one another		
At short distances from one another		

11. Explain the difference between **cations** and **anions**. (You may need to use and cite some resources.)

12. Slide 5 states that “you’ll need a positive ion and a negative ion” in order to form an ionic bond. What does this mean for the types of elements that can form ionic bonds with one another? Where are these groups of elements located on the Periodic Table?

13. Slides 9 – 13 show you how an ionic bond between sodium and chlorine would form. Draw a diagram of this new compound including its correct name, positive and negative charges, and the terms “cation” and “anion.”

14. What did you observe happened to the size of the two atoms when an electron was transferred? Can you explain this?
15. What is the difference between “chlorine” and “chloride”?
16. Slides 14 – 19 show a chemical reaction that forms salt. What type of chemical reaction is this? Write a balanced chemical equation for this reaction.
17. Draw a diagram of a “crystal” of salt at the molecular level. Why does this compound form crystals like this?
18. Question 9 above gives you an over-simplified explanation of ionic bonding. In your words, explain how ionic bonds form based on the slides and questions you’ve answered. (Stop at slide 19; you do not need to finish the rest of this online tutorial.)

Go to the [second weblink](#) and follow the interactive explanations and directions. As you go through the online activity, answer these questions about covalent bonding.

http://www.teachersdomain.org/asset/lsp07_int_covalentbond/

19. Slide 1 gives an over-simplified explanation of covalent bonding. Complete the following sentences:

Covalent bonds form when atoms are _____ .

20. Slide 2 shows two hydrogen atoms.
What happens when their electrons clouds overlap?

What happens when the nuclei get too close?

What happens when you try to separate the two atoms again?

21. Summarize what you see in slides 5 – 8. (Use diagrams or sentences or both.)

22. Question 19 above gives you an over-simplified explanation of covalent bonding. In your words, explain how covalent bonds form based on the slides and questions you've answered. (Stop at slide 14; you do not need to finish the rest of this online tutorial.)
23. What type of elements can form covalent bonds with one another? Where are these elements located on the Periodic Table?
24. Why do these elements form covalent bonds together?

Watch the second video segment, "Metallic Bonding." The beginning of this video will help you organize what you have learned already. Answer these questions about the third type of chemical bonding we will study:

25. Fill in the chart below to compare and contrast 3 major types of chemical bonds:

Type of bond	Ionic bonds	Covalent bonds	Metallic bonds
Type of elements			
Role of electrons			
Diagram of how bonding occurs			
Example compound			

26. What is the "electron problem" in metallic bonding? (This is what makes it so different than ionic and covalent bonding.)

27. How do metal atoms solve this problem together?

28. Scientists call this solution the “**sea of mobile electrons.**” Explain why this is a good term for role of the electrons in metallic bonding.

29. The last 2 minutes of the video segment shows how the “sea of mobile electrons” explains several useful properties of metals. Name three properties of metals or metallic compounds.

30. The video mentions 2 metal alloys. Here’s a little more explanation:

An alloy is a metallic substance made of more than one element. Steel, for example, is a mixture of iron atoms and carbon atoms; this mixture of atoms gives steel its incredibly durable properties. Another common alloy is bronze – a mixture of copper and tin atoms. Alloying two metal atoms has a synergistic impact, meaning that the properties of the two metals become “stronger” when they are added together.

Go to the [third weblink](http://www.bsc2.ehb-schweiz2.ch/Chemie/Simulationen%20Chemie/Bindung/Bindung%20Hundeanalogue.htm) to see a different explanation of the 3 major types of bonding.

<http://www.bsc2.ehb-schweiz2.ch/Chemie/Simulationen%20Chemie/Bindung/Bindung%20Hundeanalogue.htm>

31. In your own words, summarize the “dog bone” analogy and how it represents the 3 major types of chemical bonding. (You can use images or sentences or both.)

32. Using the “dog bone” analogy as an example, create your own original analogy to explain the 3 major types of chemical bonding. Use images and sentences to explain it below:

Other bonding resources:

http://www.teachersdomain.org/asset/lsp07_int_chembonds/

<http://www.drkstreet.com/resources/metallic-bonding-animation.swf>